FINAL STATEMENT OF REASONS
FOR
PROPOSED BUILDING STANDARDS
OF THE
CALIFORNIA ENERGY COMMISSION

REGARDING THE 2005 BUILDING ENERGY EFFICIENCY STANDARDS
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 6

COOL ROOF COATINGS PERFORMANCE REQUIREMENTS

UPDATES TO THE INITIAL STATEMENT OF REASONS

In May of 2005, the Energy Commission's Initial Statement of Reasons provided a "Statement of Specific Purpose and Rationale for Proposed Changes to Section 118(i)(3) and Table 118_C." During the public comment period, the Energy Commission reviewed all comments, which resulted in changes to the original express terms published in the Notice of Proposed Action (NOPA). Those comments, the resulting changes to the original express terms, and the rationale for making the changes are discussed in this document.

In May 2005, the Energy Commission's Initial Statement of Reasons listed the following as documents relied upon for establishing and conducting this proceeding:

> American Society for Testing and Materials (ASTM) D522-93a (2001), *Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.*
>
> American Society for Testing and Materials (ASTM) D2370-98 (2002), *Standard Test Method for Tensile Properties of Organic Coatings*.
>
> Letter from William Kirn, National Coatings Corporation, and 22 other roof coatings manufacturers, "Petition for Adoption of an Alternate Test for Liquid-Applied Roof Coatings to Meet the Cool Roof Requirements of the 2005 Building Energy Efficiency Standards (Title 24, Part 6, § 118(i)3 and Table 118-C)," dated March 28, 2005.

In the notice for the adoption hearing, the Energy Commission listed the following documents as additional documents relied upon:

> "ASTM Stds Comparison - Physical Properties, Roof Coatings, from RCMA" – Excel spreadsheet provided by the Roof Coating Manufacturers Association, June 2005.
>
> American Society for Testing and Materials (ASTM) C836-05, *Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course*.
>
> American Society for Testing and Materials (ASTM) C1583-04, *Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)*.

American Society for Testing and Materials (ASTM) D3468-99, *Standard Specification for Liquid-Applied Neoprene and Chlorosulfonated Polyethylene Used in Roofing and Waterproofing.*

American Society for Testing and Materials (ASTM) D5870-95 (2003), *Standard Practice for Calculating Property Retention Index of Plastics.*

American Society for Testing and Materials (ASTM) D6083-05e1, *Standard Specification for Liquid Applied Acrylic Coating Used in Roofing*.

American Society for Testing and Materials (ASTM) D6694-01, *Standard Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing.*

Letter from Craig Smith, Superior Products International II, Inc., to Bill Pennington and Elaine Hebert of the California Energy Commission, "Comments to: 2005 Building Energy Efficiency Standards, Proposed – California Code of Regulations, Title 24, Part 6, Section 118 (i) 3, Cool Roof Coatings Performance Requirements," dated October 19, 2005.

MANDATE ON LOCAL AGENCIES OR SCHOOL DISTRICTS

The Energy Commission has determined that the proposed regulatory action would not impose a mandate on local agencies or school districts. The proposed changes are less restrictive than current regulations.

OBJECTIONS OR RECOMMENDATIONS MADE REGARDING THE PROPOSED REGULATION(S) (Government Code Section 11346.9(a)(3))

As a result of a petition to the Energy Commission dated March 28, 2005 regarding the 2005 energy standards on physical performance requirements for liquid-applied roof coatings installed in the field, the Commission conducted this rulemaking to amend the 2005 Standards. In response to the petition, the 45-day language (published May 6, 2005) proposed adding a reference to an American Society for Testing and Materials (ASTM) standard to allow testing for the flexibility of coatings at low temperatures as an alternative to low-temperature testing for elongation and tensile strength. (The 45-day language also added references to the appropriate ASTM standard to two locations in the energy standards where information about referenced documents are listed.)

Comments Prior to Proposed 45-Day Language

Prior to the petition, in a letter dated March 8, 2005, Mr. Reed Hitchcock of the Roof Coatings Manufacturers Association (RCMA) recommended removing all language in Section 118(i)3 of the Standards regarding physical performance requirements for liquid-applied roof coatings. Mr. Hitchcock stated that "[m]any standards and codes already exist that address performance of roofing coatings and systems. Adding another dual standard will cause unnecessary duplication and confusion among our industry and our customers." To the contrary, the Energy Commission found that the California Building Code does not address roof coatings unless they are part of an entire roof assembly, and in that case the entire assembly must meet fire resistance requirements, not energy efficiency or physical performance (elongation, tensile strength, or other) properties of roof coatings. Further, referencing appropriate ASTM standards in Title 24, Part 6 for testing roof coating materials would increase clarity and reduce confusion for determining qualifying roof coatings.

RCMA's letter also expressed sentiments that physical performance requirements fell outside the scope of the Title 24 Energy Standards. The Commission disagreed; energy savings for measures such as cool roofs are calculated over an assumed life expectancy. Having performance requirements ensures that a liquid roof coating will be tested for characteristics indicating its durability such that it will not wash or peel away in too short a time; such degradation would negate any savings of electricity over time from decreased air conditioning of the occupied space.

RCMA made one more argument with which the Commission, over time, concurred: the 2005 adopted ASTM standards listed in Table 118-C for testing coatings' performance would keep some proven products from qualifying as cool roof coatings under Title 24, Part 6. The petitioners echoed this in their March 28, 2005 petition. RCMA reiterated this opinion in its letter of May 17, 2005; that letter and the resolution of these issues are discussed below, under "Comments on Proposed 45-Day Language."

Mr. Craig Smith of Superior Products International II, Inc. sent the Energy Commission a letter dated May 10, 2005. His letter addressed the portion of Section 118(i)3 stating a required minimum thickness of 20 dry mils for liquid roof coatings. He stated that his company manufactured a product that had a proven track record at 10 dry mils. The Commission researched mil thickness extensively over ensuing months (to this end, Mr. Smith sent a second letter in October 2005, discussed below in chronological order) and found that some chemistries of coatings could indeed demonstrate durability even at 10 mils. The final language reflects this by replacing the 20 mil thickness with the manufacturer's recommendation for thickness or coverage.

Comments on Proposed 45-Day Language

RCMA submitted a letter dated May 17, 2005, again stating its objections to Table 118-C on the basis that the performance criteria listed therein were beyond the scope of the energy standards. However, the letter's author Mr. Reed Hitchcock conceded that the roof coating industry had participated substantially in developing Table 118-C and agreed that Table 118-C should stay. He then offered further ASTM standards to add to Section 118(i)3. These additional ASTM standards addressed roof coatings that RCMA believed met the goals of the energy standards but were not explicitly addressed in the energy standards. On June 3, 2005, Mr. Dick Gillenwater of Carlisle SynTec Incorporated sent a letter responding to and modifying some of the RCMA ASTM recommendations. About this same time, RCMA submitted a spreadsheet summarizing and comparing the physical performance and test requirements in the ASTM standards in question. The Commission examined these ASTM standards closely and kept some while eliminating others that proved inappropriate. Those agreed upon by the Commission and stakeholders are included in the adopted language. The Commission considers RCMA's spreadsheet to be a document relied upon for this rulemaking,

In this same letter of May 17, 2005, RCMA suggested that for liquid coatings that did not meet Table 118-C or the agreed-upon added ASTM standards, their respective manufacturers be allowed to appeal to the International Code Council (ICC) for special evaluation or be allowed to comply with applicable International Building Code (IBC) or International Residential Code (IRC) requirements.. In his June 3 letter, Mr. Gillenwater questioned the wisdom of using ICC test criteria, having reviewed them and finding none pertaining to coatings. Later in 2005, the Commission explored the possibility of including the ICC evaluation as an option, but Mr. Craig Smith, whose company had gone through the ICC evaluation process for coatings, experienced it as slow, cumbersome, and costly. The Commission wished not to impose a burden that would

unreasonably disadvantage some roof coating manufacturers; therefore, the suggestion to use an ICC evaluation process was rejected.

Mr. Paul Beemer of Henry Company sent a letter June 2, 2005. He believed "that the application rate and physical property requirements imposed by Section 118(i)3 and by Table 118-C are unrelated to the quality, durability, or performance of roof coatings in general, and in many cases effectively mandate products which are inferior for specific applications." Mr. Beemer suggested that the mil thickness required in the energy standards be the same as that used in the testing conducted through the Cool Roof Rating Council (CRRC). The Commission consulted the CRRC but found this suggestion to be unworkable – CRRC does not specify a mil thickness for coatings in its procedures. In order to establish a common basis for testing all coating products, CRRC specifies a smooth metal substrate and allows an alternate substrate chosen by the manufacturer and approved by CRRC. Most manufacturers use the specified metal. This type of substrate is rarely found in actual roof installations. Therefore, whatever mil thickness is used in CRRC testing cannot would not be relevant to the myriad of substrates occurring in the field, many of which are not as smooth and blemish-free as the metal specified by CRRC.

The Energy Commission held a public hearing on proposed 45-day language on June 7, 2005. Here is a summary of the objections and recommendations from that hearing:

Mr. Joe Mellott of Momentum Technologies, representing RCMA, said that the proposed 45-day language proposals, though allowing additional qualifying coating products, did not go far enough. He made the following points: 1) some durable products not meeting 45-day language proposals were disallowed; 2) the proposed language disallowed products that failed to meet performance criteria yet had a long history of exemplary performance in the field; and 3) the 45-day language criteria were not standard for industry and could tilt the marketplace, create a shortage of compliant products, and increase costs to consumers. Subsequent to this public hearing, Mr. Mellott participated in a number of conference calls with the Commission, other RCMA members, and other stakeholders and agreed to the proposals discussed above under the comments in RCMA's May 17 letter.

Mr. Mellott also felt it unjust that the energy standards did not include similar performance criteria for other elements of the building envelope. The Commission actually addresses durability concerns, other performance issues that have implications for energy savings, and other such matters when they are not adequately addressed by other portions of the California codes. Performance standards exist in other parts of the building code and under the jurisdiction of other state agencies for lumber, wall insulation, etc, and the energy standards include performance criteria for windows, doors, and skylights. While developing the 2005 energy standards, the Energy Commission worked with members of the roofing industry to identify gaps in performance standards for roofing materials; coatings were recognized as a particular concern where durability of the material could have serious energy consequences. Some other roof materials such as single-ply membranes often serve as the waterproofing membrane, for which a number of performance standards exist (coatings are rarely the waterproofing component of a roof assembly). Through the public process of vetting the cool roof proposals for 2005, no stakeholders brought forth substantive information on the need for performance standards for other roofing products.

Mr. Bill Kirn of National Coatings and Mr. Mellott debated the wisdom of adding ASTM D6083 to the energy standards. It applies to acrylic coatings for all U.S. climates. In the end, the Commission concluded it was appropriate to include ASTM D6083 along with several other similar ASTM standards that addressed other types of coatings.

Mr. Kirn clarified that the intent of the petitioners was to suggest the flexibility test (Test B) in ASTM D522 at 0 degrees F as an alternative to initial tensile strength as well as to initial elongation and aged elongation tests at 0 degrees F; due to a misunderstanding this was not reflected properly in 45-day language. The Commission made this correction in the final language.

Mr. Paul Beemer of Henry Company felt that the physical (performance) properties were irrelevant to durability. Henry Company had coatings that met neither ASTM D6083 nor energy standards' Table 118-C but, he claimed, had lasted 20 years. He referred to a study on roof coatings (none from Henry Company) by the Midwest Roofing Contractors Association.* Mr. Beemer did not provide further evidence about the Henry coatings. Mr. Kirn disagreed with Mr. Beemer and stressed the importance of elasticity in roof coatings for colder climates, supporting the addition of test protocols such as ASTM D6083 to the energy standards.

Mr. Stan Pepper of GreenProducts supported Mr. Beemer's opinion that performance standards were immaterial to durability and asserted that much depends on the roof substrate underneath; his products are designed for particular substrates. Some of his products could pass the flexibility tests suggested by the petitioners and some not. Both Mr. Beemer's and Mr. Pepper's comments were directly in conflict with major industry consensus efforts to develop and implement ASTM standards to address durability problems. The Commission remained convinced that performance standards were essential and clearly have bearing on durability in most cases.

Mr. Chris Salazar of Karnak Corporation stated that Table 118-C was too restrictive and did not allow some good durable products. Mr. Salazar worked with the Commission after this hearing to add ASTM standards to accommodate more coatings.

Mr. Craig Lease of L&L Suppliers wanted to add specific mil thicknesses for his class of products (cementitious coatings) over specific substrates. The Commission addressed this suggestion in the final language by stating that the manufacturer could recommend the mil thickness, taking the substrate into consideration.

Mr. Mellott suggested third-party verification to confirm that products met the performance criteria (ASTM standards) in Table 118-C. The Commission imposes third-party verification in its energy standards when there is a well-demonstrated problem that can be addressed only through verification approaches that are unreasonable for local building departments to utilize. In this case the Commission has no evidence that there is a problem sufficient enough to warrant third-party verification.

Mr. Matt Pickett of GAF Materials suggested separating performance and durability from energy efficiency. RCMA had made essentially this same comment in its original letter of March 8, and the Commission's response is discussed above.

Other Comments Prior to 15-Day Language

Mr. Bob Hyer of APOC responded July 11, 2005, to the petitioners' original March 28 letter and to comments at the June 2005 public hearing. Mr. Hyer expressed concerns that adding the proposed ASTM D522 flexibility test, as applied to acrylic coatings, could result in an increase in the use of inferior acrylic products that would fail prematurely in the field. He also asserted that some products passed ASTM D6083 (a standard for acrylic coatings only) but still failed in the

* Commission staff reviewed a progress report from this study (the latest report available) but found it to be of limited use; only two "cool" coatings were being used, both acrylic, one premium grade and one "commodity" grade. The final report is under preparation.

field, and he further asserted that the process of developing ASTM D6083 was flawed. Mr. Matt Kolb of National Coatings Corporation responded to these assertions in a letter July 13, 2005. Mr. Kolb believed that the development of ASTM D6083 was fair and reasonable and disagreed with Mr. Hyer that the ASTM D522 flexibility test would result in inferior product usage. Mr. Kolb stressed that ASTM D522 was proposed as an optional alternative to ASTM D2370 and not as a requirement.

The Commission believes it has addressed this issue by including several ASTM standards that apply to the full range of coatings on the market, recognizing that there are many coating types besides acrylics that are commonly in use. In addition, the Commission's proposed standards enable compliance with the manufacturers' recommended coating thickness or coverage for their coatings, taking the substrate into consideration. Based on input from the petitioners and other stakeholders, the Commission disagrees with Mr. Hyer that the inclusion of ASTM D522 for testing flexibility of coatings as an alternative to testing elongation and tensile strength at low temperatures would result in inferior products entering the market. At the same time, the Commission recognizes that the energy standards cannot prevent with certainty the use of inferior roof coatings in all cases. Several stakeholders have commented informally that, as with many other goods and products, the market will over time filter out the inferior ones. The Commission has done due diligence on this matter and been very open to comments that are backed up by evidence and strong reasoning, and the large majority of stakeholders in the proceeding agree with the proposed revisions.

Mr. Hyer made several other comments. He refuted the higher cost of the elongation test in ASTM D2370 and claimed that D2370 is more accurate than the mandrel test. The Commission took his comments into consideration but does not believe that Mr. Hyer adequately substantiated his comments. Mr. Hyer also asserted that California has unique UV exposure, smog, and other conditions that create "a much harsher weathering environment than other regions of the country" and "cause additional stress and wear on all roofing products." Again, he provided no statistics or supporting evidence. Other parts of the country, such as Texas and Louisiana, suffer from severe hurricanes, torrential rains, high humidity (with resulting fungal and algal growth on roofs), and hotter summer temperatures that contribute to smog formation, and some regions such as Minnesota and Alaska experience much colder temperatures for longer durations than in any of California's populated areas.

Mr. Kolb noted in his response letter to Mr. Hyer that the energy standards needed to address not just acrylics but other coating chemistries as well. Mr. Kolb disagreed with Mr. Hyer that having ASTM D522 as an alternative option for testing coatings at low temperatures compromised the energy standards. He also noted that ASTM D6083 was developed to apply to all climates in the U.S. including California's.

Mr. Joe Raver of Thermoshield Inc. responded to Mr. Hyer's letter on July 27. Mr. Raver offered a number of examples of his products' experience in the "real world" that refute Mr. Hyer's negative assertions about ASTM D522. The Commission found these and other arguments persuasive and included ASTM D522 in the final proposed language for Table 118-C.

Mr. Steve Heinje of United Coatings, in his letter of August 2, 2005, recommended including ASTM D6083 among the referenced standards in Section 118(i)3. Other discussions with stakeholders supported this recommendation, and as discussed previously, the Commission included ASTM D6083 in the final language.

In addition to his letter of May 10, Mr. Craig Smith of Superior Products sent another letter October 19, 2005, reiterating his company's opposition to the minimum dry thickness of 20 mils

and suggesting that manufacturers be allowed to specify mil thickness. The Commission agreed and consider this letter to be one of the Commission's documents relied upon for this rulemaking.

Comments on 15-day Language

Ms. Bernadette Corujo of Rohm and Haas and Mr. Richard Gillenwater of Carlisle SynTech Incorporated submitted letters on April 11 and April 24, 2006, respectively, both with concerns about the proposed removal of a minimum dry thickness of 20 mils for roof coatings. The Commission had considered these arguments previously and believes that the original minimum 20 mil thickness requirement reasonably applies to only some types of roof coatings. Mr. Smith and others provided evidence that some chemistries of roof coatings could be applied at less than 20 mils and prove durable. At the adoption hearing on April 26, 2006, Mr. Joseph Rokowski of Rohm and Haas requested that this issue be revisited for the 2008 energy standards and offered to participate in those discussions.

DETERMINATION OF ALTERNATIVES CONSIDERED AND EFFECT ON PRIVATE PERSONS

(Government Code Section 11346.9(a)(4))

The California Energy Commission has determined that no alternative considered would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective as and less burdensome to affected private persons than the adopted regulation. In conference calls subsequent to the June 7, 2005, hearing, Commission staff discussed a number of alternatives with the petitioners and other June 7 participants, gave serious consideration to all the alternatives, and consulted other parties as appropriate to help evaluate these alternatives.

The final express terms reflect standards that are less restrictive than the 2005 (current) standards.

REJECTED PROPOSED ALTERNATIVE THAT WOULD LESSEN THE ADVERSE ECONOMIC IMPACT ON SMALL BUSINESSES: (Government Code Section 11346.9(a)(5))

The California Energy Commission has determined that there are no possible impacts on small businesses that could result from these less restrictive requirements.

COMMENTS MADE BY THE OFFICE OF SMALL BUSINESS ADVOCATE

(Government Code Section 11347.6)

Not applicable.

COMMENTS MADE BY THE TRADE AND COMMERCE AGENCY

(Government Code Section 11347.6)

Not applicable.